CLAIMS

1.   A method of fault detection in manufacturing equipment having at least one sensor with at least one output indicative of the present state of the equipment, comprising the steps of:

      (a) establishing sensor data that are representative of a state of the equipment under a fault condition, said fault condition generating a recordable fault fingerprint,

      (b) storing the data in a fault fingerprint library,

      (c) determining the present state of equipment using at least one sensor, and

      (d) detecting a fault based on a comparison of the present state sensor data with at least one fault fingerprint in the fault fingerprint library.

2.   The method claimed in claim 1, wherein the fault fingerprints is substantially invariant across different manufacturing equipment built to the same nominal specification and running the same nominal process.

3.   The method claimed in claim 2, wherein in step (d) the comparison is made between a set of vectors representing the deviation of sensor data from nominal values for the fault fingerprint and the corresponding set of vectors representing the deviation of sensor data from nominal values for the present state.

4.   The method claimed in claim 3, wherein the nominal values used for calculating the set of vectors for the present state are nominal values of the sensor data from the sensor of the said manufacturing equipment.

5.   The method claimed in claim 3, wherein the nominal values used for calculating the set of vectors for the present state are nominal values of the sensor data from the sensor of different manufacturing equipment built to the same nominal specification and running the same nominal process as the first mentioned manufacturing equipment.

6.   The method claimed in claim 3, wherein the comparison is made by correlation between the sets of fault fingerprint and present state vectors.

7.   The method claimed in claim 3, wherein the comparison is made by calculating a Euclidean distance between the sets of fault fingerprint and present state vectors.

5   8.   The method claimed in claim 1, further comprising the step of predicting the impact of the fault on a particular process output.

9.   The method claimed in claim 1, further comprising the step of controlling at least one equipment input to compensate for the fault.

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10.   The method claimed in claim 1, wherein the fault fingerprint is derived from a tool profile comprising a set of equipment input versus sensor response curves.

11.   The method claimed in claim 1, wherein the manufacturing equipment comprises a
15   plasma chamber.

12.   A computer readable medium containing program instruction which, when executed by a data processing device, perform the method steps claimed in claim 1.